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Ogasawara

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(54) **INTERMEDIATE TRANSFER RECORDING APPARATUS FOR RETRANSFERRING PRIMARY TRANSFER IMAGE ON DISK-LIKE TRANSFER MEDIUM**

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(52) **U.S. Cl.** **347/103**
(58) **Field of Search** 347/103, 120, 347/20, 111, 159, 141, 155, 127, 128, 17, 154, 61; 399/271, 290, 292, 293, 294, 33, 67, 320

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(57) **ABSTRACT**

A dummy image is formed on a periphery of a retransfer image region on a transfer medium where a primary transfer image is not retransferred on the transfer medium when the primary transfer image is formed on the intermediate transfer film. As the result, peeling tension exerted on the intermediate transfer film is approximately even in a width direction, the primary transfer image is retransferred onto the transfer medium without changing of a transfer condition, and an optimal retransfer condition can be obtained.

12 Claims, 4 Drawing Sheets

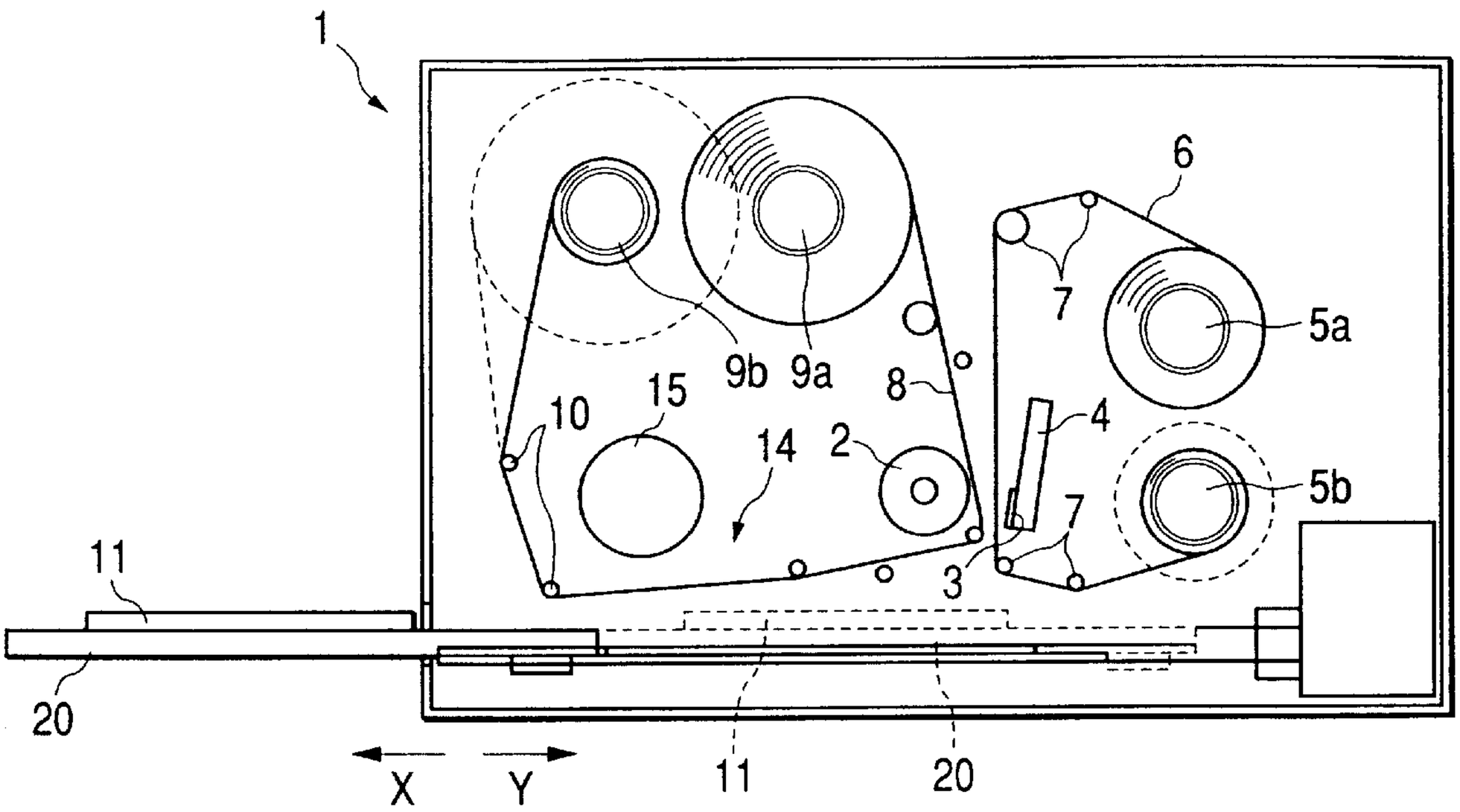


FIG. 1

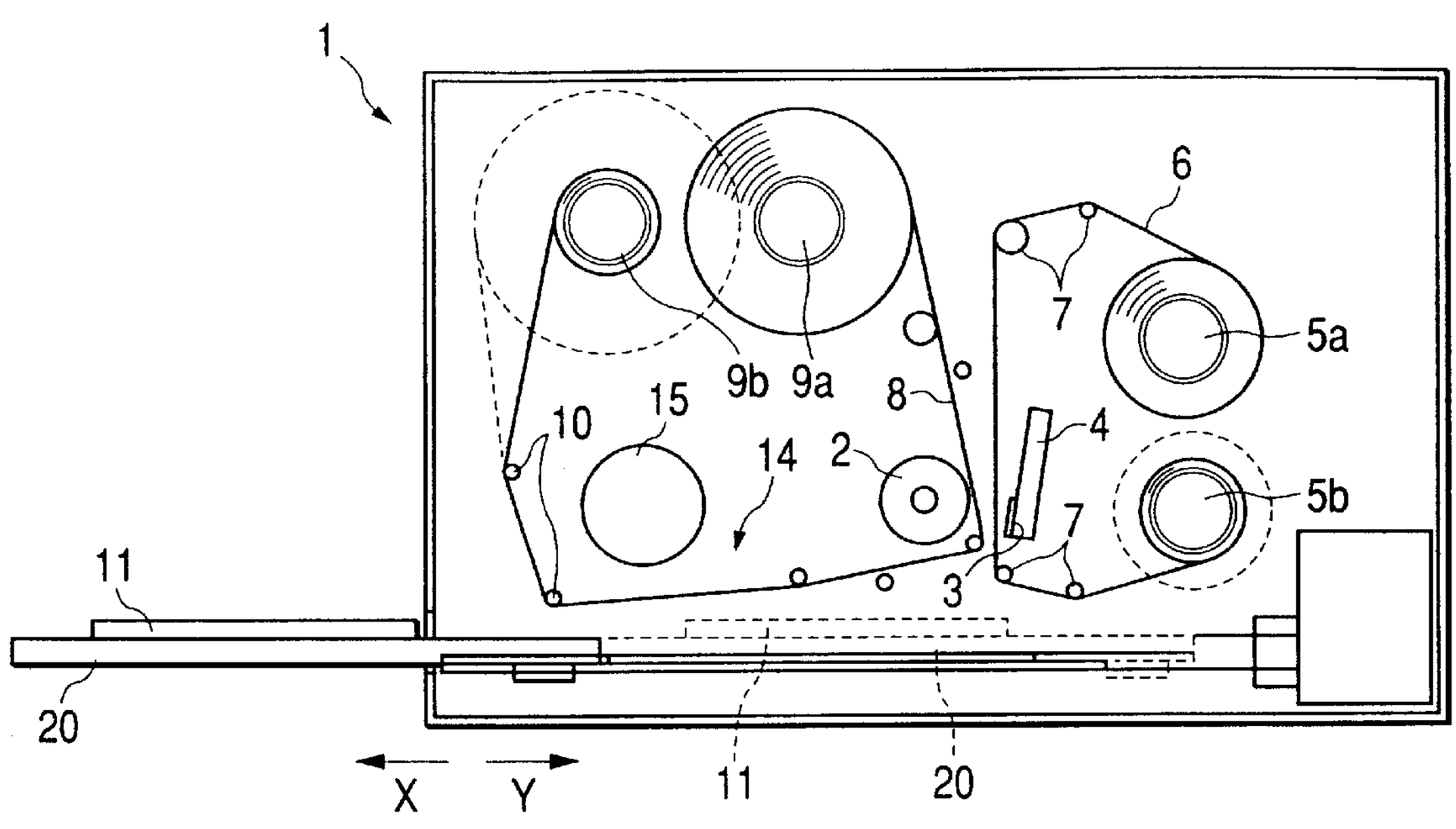


FIG. 2

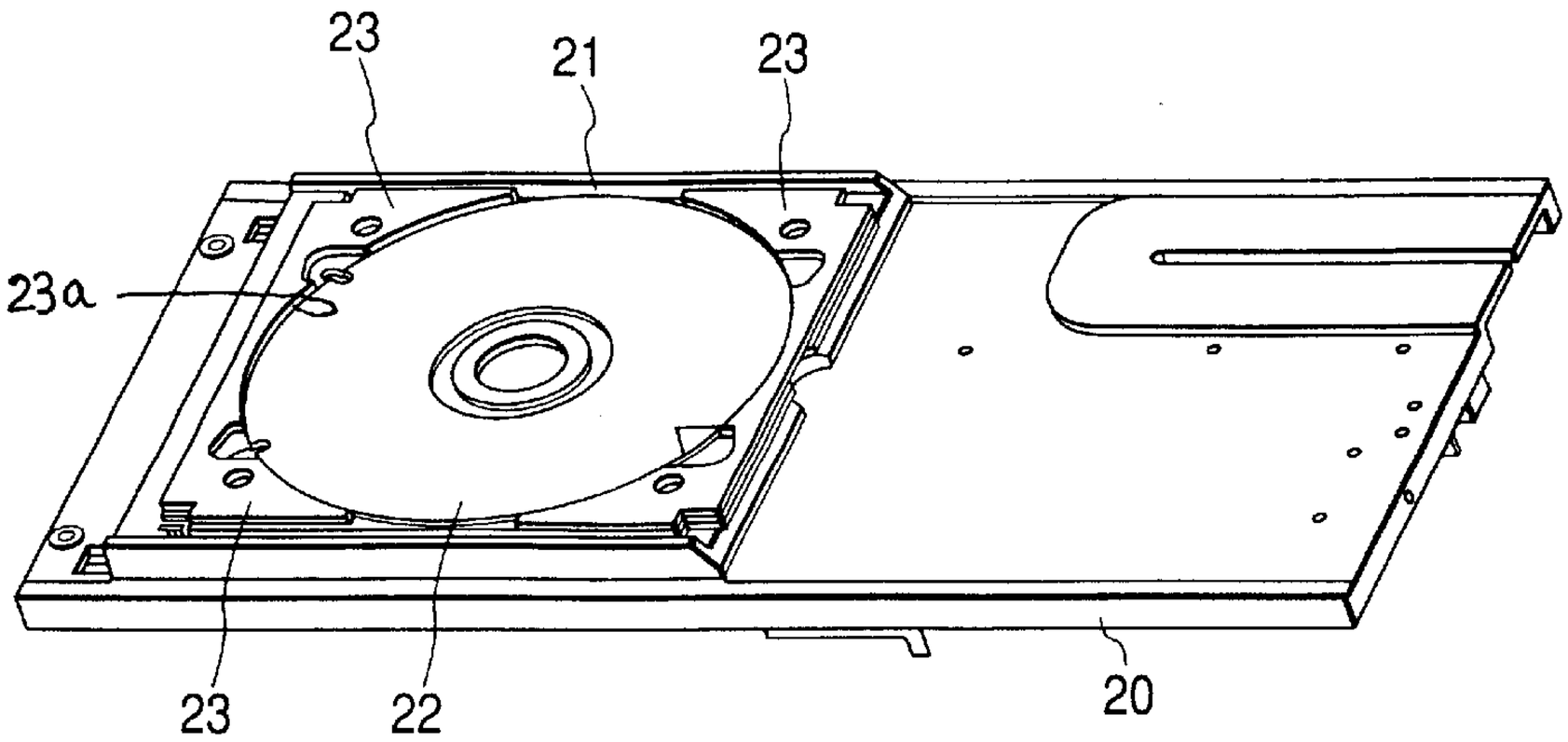


FIG. 3

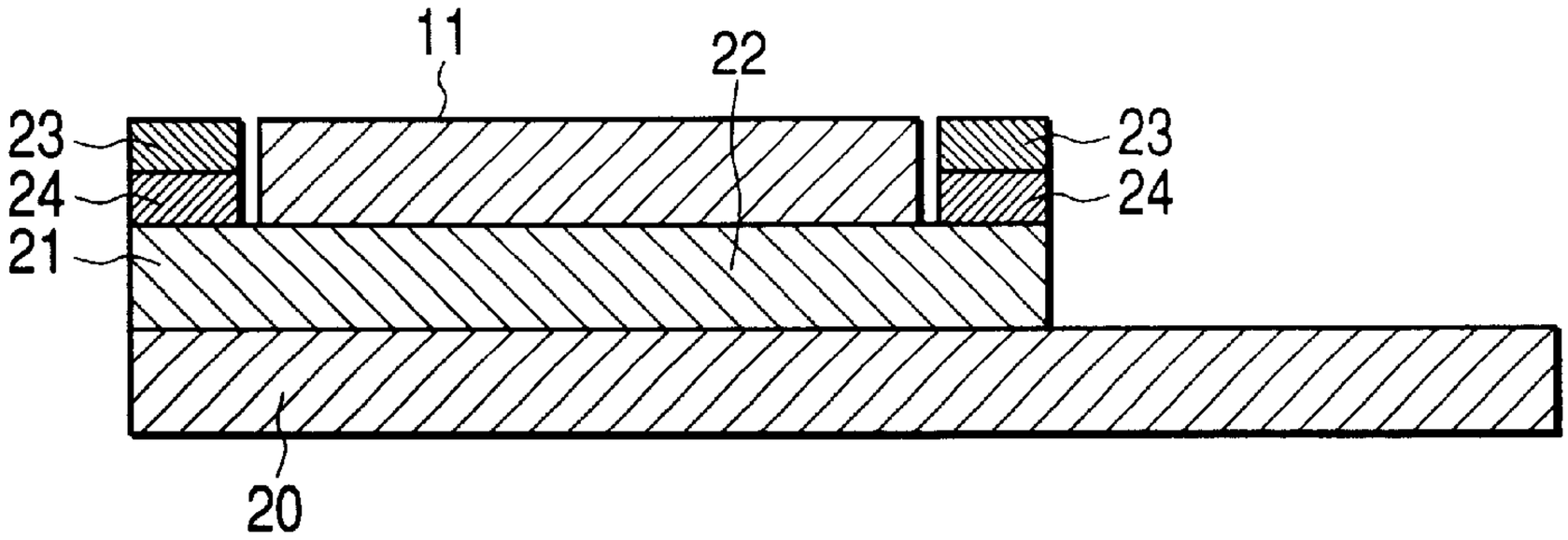


FIG. 4

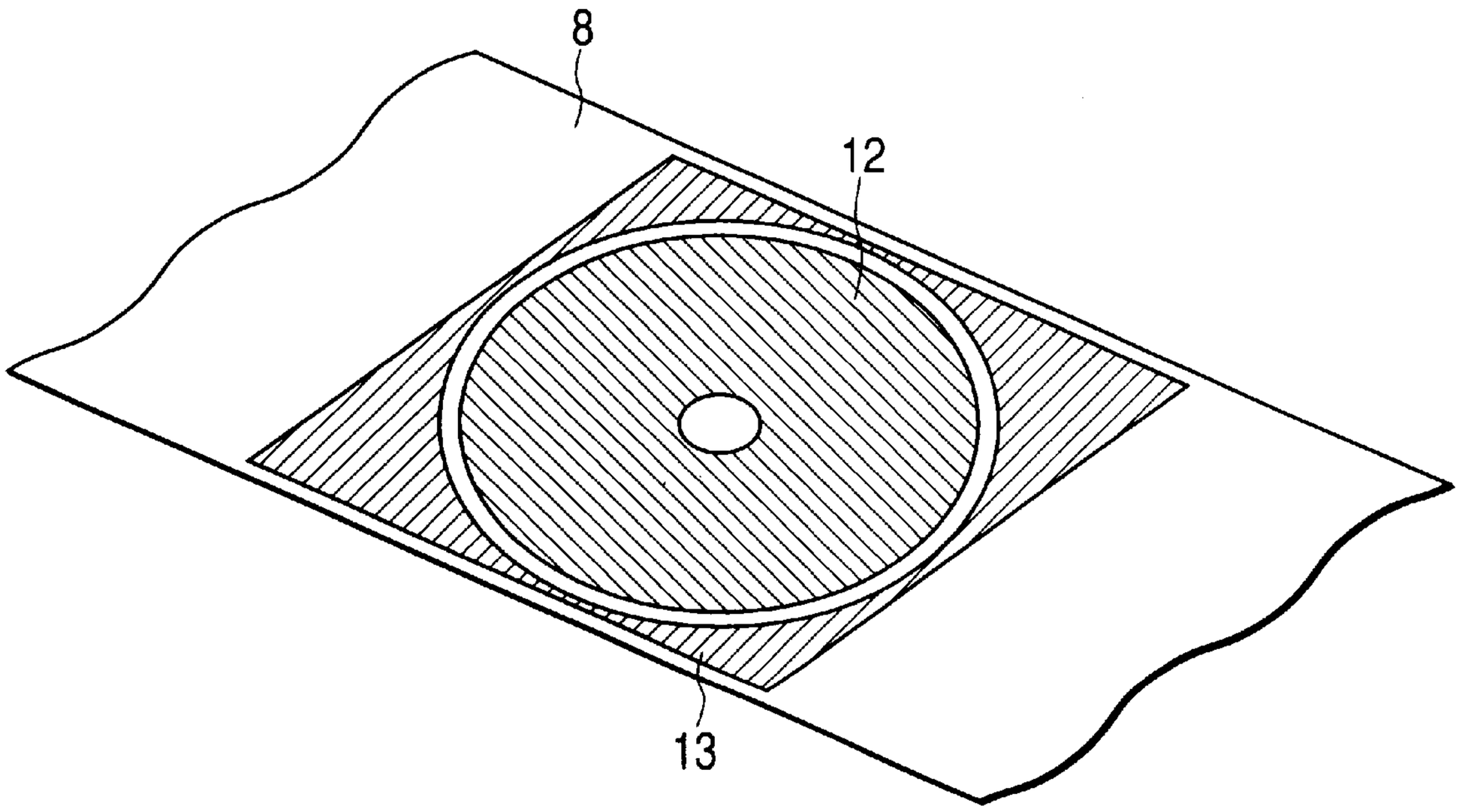


FIG. 5

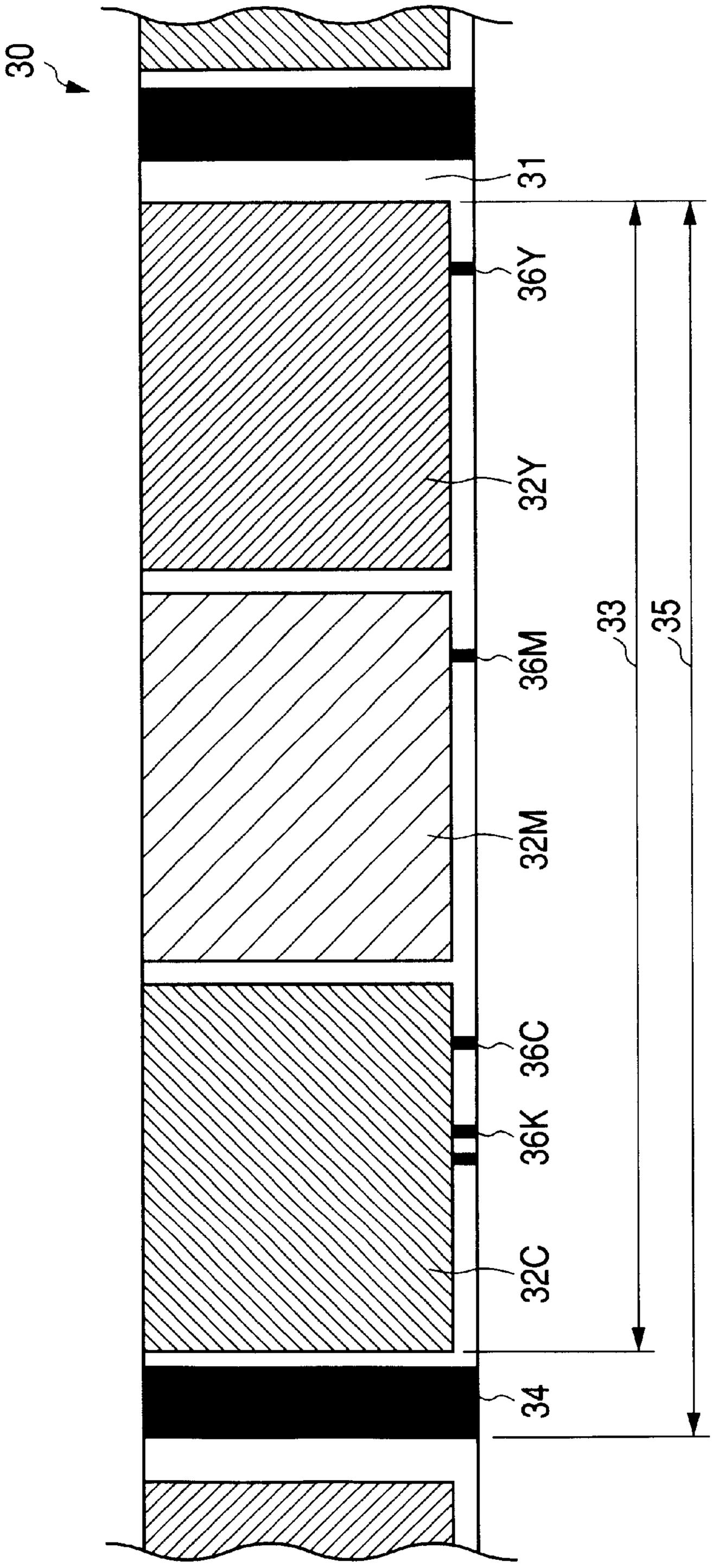
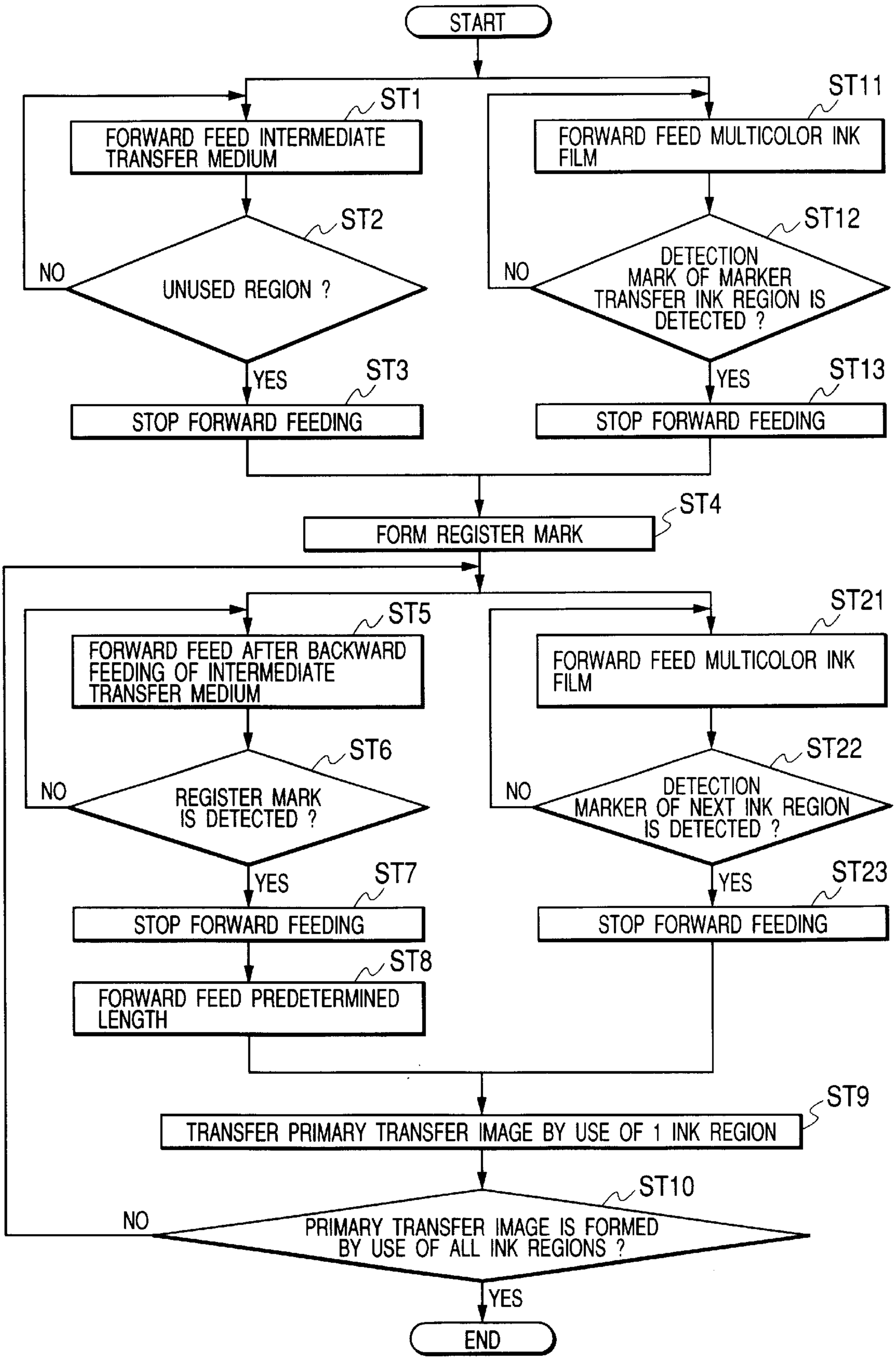


FIG. 6


START
ST1
FORWARD FEED INTERMEDIATE TRANSFER MEDIUM
ST2
NO
UNUSED REGION ?
YES
ST3
STOP FORWARD FEEDING
ST11
FORWARD FEED MULTICOLOR INK FILM
ST12
NO
DETECTION MARK OF MARKER TRANSFER INK REGION IS DETECTED ?
YES
ST13
STOP FORWARD FEEDING
ST4
FORM REGISTER MARK
ST5
FORWARD FEED AFTER BACKWARD FEEDING OF INTERMEDIATE TRANSFER MEDIUM
ST6
NO
REGISTER MARK IS DETECTED ?
YES
ST7
STOP FORWARD FEEDING
ST8
FORWARD FEED PREDETERMINED LENGTH
ST21
FORWARD FEED MULTICOLOR INK FILM
ST22
NO
DETECTION MARKER OF NEXT INK REGION IS DETECTED ?
YES
ST23
STOP FORWARD FEEDING
ST9
TRANSFER PRIMARY TRANSFER IMAGE BY USE OF 1 INK REGION
ST10
NO
PRIMARY TRANSFER IMAGE IS FORMED BY USE OF ALL INK REGIONS ?
YES
END

INTERMEDIATE TRANSFER RECORDING APPARATUS FOR RETRANSFERRING PRIMARY TRANSFER IMAGE ON DISK-LIKE TRANSFER MEDIUM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an intermediate transfer recording apparatus in which ink of an ink film is transferred onto an intermediate transfer film by means of a line thermal head to form a primary transfer image, and the primary transfer image is retransferred onto a disk-like transfer medium by means of retransfer means to thereby form an image on the transfer medium.

2. Description of the Related Art

Heretofore, the intermediate transfer recording apparatus in which ink of an ink film is transferred onto an intermediate transfer film comprising a long resin film consisting of resin such as polyethyleneterephthalate by means of a line thermal head to form a primary transfer image, and the primary transfer image is retransferred onto a transfer medium by means of retransfer means to thereby form an image on the transfer medium has been used as the recording apparatus for forming an image on various transfer media such as optical disks like CDs and cards.

In the case of a conventional intermediate transfer recording apparatus as described hereinabove, in the primary transfer image forming section, the line thermal head is brought into the head-down state in which the line thermal head is pressed on a platen roller with interposition of an ink film and an intermediate transfer film in this order, and some heating elements of the line thermal head are heated selectively based on image forming information while moving the ink film and the intermediate transfer film in this state to thereby partially melt or sublimate and transfer the ink of the ink film onto the intermediate transfer film. As the result, for example, a reverse image that is the primary transfer image for the area corresponding to an image recording region of a transfer medium is formed on the intermediate transfer film.

Furthermore, in the case where a multicolor image is formed on a transfer medium, a multicolor primary image is formed by means of so-called swing-back technique as described hereunder. A multicolor ink film on which a plurality of color ink regions are arranged so that different colors are repeated adjacently in a longitudinal direction is used as an ink film. At first, a reverse image of the first color ink that is carried on the multicolor ink film is formed on an intermediate transfer film. Then, a line thermal head is brought into a head-up state in which the line thermal head is separated from a platen, and the intermediate transfer film is moved reversely in this state. The reverse image formed with the first color ink is returned to the transfer position for start alignment, and a reverse image of the next color is transferred on the reverse image of the first color one on the other.

In detail, in the case where a full-color image is formed, a multicolor ink film on which a plurality of three-color ink regions, each of which consists of three colors, for example, C (cyan), M (magenta), and Y (yellow) are arranged in this order so as to be repeated adjacently in the longitudinal direction and which has color-discrimination marks on the boundary between different ink regions is used.

In detail, at first a register mark that has been marked previously on the intermediate transfer film is detected, and

a C-color reverse image for the area corresponding to the recording region of the transfer medium is formed on the intermediate transfer film by using the register mark as the reference by use of a C-color ink region of the multicolor ink film. Next, the intermediate transfer film that has been moved in the primary transfer image forming operation is moved reversely and the C-color reverse image that has been formed on the intermediate transfer film is aligned, and an M-color ink region that is adjacent to the C-color of the multicolor ink film is aligned and an M-color reverse image is formed on the C-color reverse image that has been formed on the intermediate transfer film by use of an M-color ink region of the multicolor ink film. Subsequently, a Y-color ink region is aligned in the same manner as described hereinabove, a Y-color reverse image is formed additionally on the intermediate transfer film by use of a Y-color ink region of the multicolor ink film to thereby form a full-color primary transfer image for the area corresponding to the recording region of the transfer medium on the intermediate transfer film.

Thereafter, the intermediate transfer film is moved so that the primary transfer image that has been formed on the intermediate transfer film is moved to the position located just before the retransfer position. Then, the primary transfer image is registered with a transfer medium by use of a register mark formed on the intermediate transfer film, the primary transfer image that has been formed on the intermediate transfer film is melted or sublimated to retransfer and fix it on the transfer medium by heating and pressing by use of the retransfer means comprising a heating roller in the retransfer section to thereby form a desired image on the transfer medium.

However, the conventional primary transfer image formed on an intermediate transfer film only forms a primary transfer image for a area corresponding to a recording region of a transfer medium. Therefore, in the case where a primary transfer image is retransferred onto a disk-like transfer medium such as a CD, because the transfer medium is circular, the central portion of the primary transfer image of the intermediate transfer film is brought into contact with the disk at the start of retransfer, only the central portion is adhered on the transfer medium and both sides are not adhered. As a result, the peeling tension exerted on the intermediate transfer film is differentiated in the width direction of the intermediate transfer film. The adhered region of the primary transfer image on the transfer medium increases as the retransfer proceeds, and then decreases as the retransfer further proceeds after the middle point. As a result, the transfer condition for the transfer medium is not constant, good transfer condition cannot be obtained, and a good quality image cannot be formed on the transfer medium, which is disadvantageous.

The present invention has been accomplished in view of the abovementioned problem, it is the object of the present invention to provide an intermediate transfer recording apparatus that operates a process in which an adhesion region of an image is maintained constant throughout a retransfer operation from the start of retransfer to the end of the retransfer when a primary image of the intermediate transfer film is retransferred onto a disk-like transfer medium to bring about an optimal transfer condition to allow the formation of a good image recorded on the transfer medium.

To achieve the abovementioned object, an intermediate transfer recording apparatus in accordance with the present invention is characterized in that a dummy image is formed on a periphery of a retransfer image region on the transfer

medium where the primary transfer image is not retransferred when the primary transfer image is formed on the intermediate transfer film. Because the abovementioned structure is employed, the dummy image is formed on a region where the primary transfer image is not retransferred on the transfer medium on the periphery of the retransfer image region corresponding to the transfer medium when the primary transfer image is formed on the intermediate transfer film. Thereby, the dummy image is in contact with an upper surface of a guide member of the transfer medium on the periphery of the transfer medium when the primary image is retransferred onto the transfer medium, and heated and pressed by means of heating means. The dummy image is retransferred in the same manner as in the case where the primary image is retransferred onto the transfer medium, and the retransfer region is maintained approximately constant throughout the retransfer operation, peeling tension exerted on the intermediate transfer film is approximately even in a width direction, and the primary transfer image is retransferred onto the transfer medium without changing of a transfer condition. As the result, an optimal retransfer condition can be obtained.

Furthermore, the intermediate transfer recording apparatus in accordance with the present invention is additionally characterized in that the dummy image is formed on the periphery of the primary transfer image with a predetermined space between the dummy image and the primary transfer image. Because the abovementioned structure is employed, retransfer of the dummy image onto the transfer medium is prevented even if registration between the primary image and the transfer medium deviates slightly when the primary image is retransferred onto the transfer medium.

Furthermore, the intermediate transfer recording apparatus in accordance with the present invention is additionally characterized in that an outside peripheral configuration of the dummy image is rectangular. Because the abovementioned structure is employed, the retransfer region is maintained constant throughout the retransfer operation from the start when the primary image is retransferred onto the transfer medium, and as the result a retransfer condition is optimized.

Furthermore, the intermediate transfer recording apparatus in accordance with the present invention is additionally characterized in that the dummy image is formed with a density lower than that of the primary transfer image. Because the abovementioned structure is employed, the power supplied to the thermal head can be reduced for the dummy image forming region, and as a result power consumption can be reduced.

Furthermore, the intermediate transfer recording apparatus in accordance with the present invention is additionally characterized in that the dummy image can be formed using at least one color ink layer of a multicolor ink film and the dummy image is formed with thermal energy that is smaller than that of the primary transfer medium. Because the abovementioned structure is employed, not only is power saved but also the time required to form the dummy image is shortened in comparison with the case in which all of the color ink layers are used for forming the dummy image.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a partial explanatory diagram showing the first embodiment of an intermediate transfer recording apparatus in accordance with the present invention;

FIG. **2** is a perspective view showing the structure of a moving table of the intermediate transfer recording apparatus in the embodiment shown in FIG. **1**;

FIG. **3** is a partial cross sectional view for describing the relative vertical level relation between a guide and a transfer medium that appears when the transfer medium is held on a mounting tray of the intermediate transfer recording apparatus in the embodiment shown in FIG. **1**;

FIG. **4** is an explanatory diagram showing the primary transfer image and the dummy image formed on the intermediate transfer film in the embodiment shown in FIG. **1**;

FIG. **5** is a plan view for describing the structure of a multicolor ink film shown in the second embodiment of an intermediate transfer recording apparatus in accordance with the present invention; and

FIG. **6** is a flowchart showing the recording method for the recording of the primary transfer image onto the intermediate transfer film by use of the multicolor film shown in FIG. **5**.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** shows an intermediate transfer recording apparatus in accordance with the present embodiment. As shown in FIG. **1**, a recording apparatus body **1** of the intermediate transfer recording apparatus is provided with a cylindrical platen roller **2** rotatably, a line thermal head **3** on the surface of which a plurality of heating elements (not shown in the drawing) are arranged fixed to a head mounting base **4** at a position facing the platen roller **2**, wherein the line thermal head **3** is disposed so as to be in/off contact with the platen roller **2** when the head mounting base **4** is turned.

A feeding side film roller **5***a* and a winding side film roller **5***b* on which both ends of a long ink film **6** are fixed and wound are provided on one side of the recording apparatus body **1**. The ink film **6**, which is wound on the film rollers **5**, is drawn between the platen roller **2** and the line thermal head **3** with guiding by means of a plurality of guide rollers **7**.

A retransfer section **14** for retransferring the primary transfer image **12** formed on the intermediate transfer film **8** onto a disk-like transfer medium **11** such as a CD is provided downstream from the platen roller **2** in the moving route of the intermediate transfer film **8**. In the retransfer section **14**, a heating roller **15** that serves as a retransfer roller and heating and pressing means is disposed movably in the vertical direction in FIG. **1** at a position above the intermediate transfer film **8**.

Furthermore, a moving table **20** for moving the transfer medium **11** is disposed so as to be moved in the direction of arrows X and Yin the lower inside portion of the recording apparatus body **1**, and as shown in FIG. **2**, a holding tray **21** on which the transfer medium **11** is placed and held is provided so as to face the heating roller **15** with interposition of the intermediate transfer film **8** on the top surface of the moving table **20**. The moving table **20** is structured to move reciprocally between the position (position indicated with a solid line) where the moving tray **21** is exposed outside the recording apparatus body **1** and the position (position indicated with a dashed line) that is apart to the right side in FIG. **1** from the position where the left side end in FIG. **1** of the transfer medium **11** placed on the holding tray **21** is in contact with the heating roller **15**.

Furthermore, as shown in FIG. **2**, a guide member **23** for guiding the peripheral edge of the transfer medium **11** is disposed on the periphery of the holding portion **22** of the holding tray **21** on the moving table **20** on which the transfer medium **11** is held, and an inside peripheral surface **23***a* of the guide member **23** is formed in a circular arc to extend along the outside peripheral surface of the transfer medium **11**.

Furthermore, the guide member **23** is formed so that the vertical position of the surface of the guide member **23** is at the same level as the vertical position of the surface of the transfer medium **11** when the transfer medium **11** is placed on the holding portion **22** as shown in FIG. **3**. Thereby, when the transfer medium **11** is placed on the holding tray **21** and the heating roller **15** is lowered to retransfer the primary transfer image **12** that has been formed on the intermediate transfer film **8** onto the transfer medium **11**, the heating roller **15** is brought into contact with the surface of the transfer medium **11** and the surface of the guide member **23** that are positioned at the same vertical level with interposition of the intermediate transfer film **8**.

The surface of the guide member **23** is coated with a fluorine material to prevent the ink of a dummy image **13** (refer to FIG. **4**) formed on the intermediate transfer film **8** from being transferred. Furthermore, an elastic member **24** consisting of rubber material is disposed under the guide member **23**. The elastic member **24** may be optional.

The intermediate transfer recording apparatus as described hereinabove is operated for recording the image onto the transfer medium **11** as described hereinafter.

At first, the moving table **20** is moved in the direction of the arrow X to the position where the holding tray **21** is exposed outside the recording apparatus body **1** (position indicated with a solid line shown in FIG. **1**) and the transfer medium **11** is placed on the holding tray **21**, and then the moving table **20** is moved in the direction of the arrow Y to return it to the retransfer section **14** (position indicated with a broken line shown in FIG. **1**).

Next, the line thermal head **3** is brought into pressure contact with the platen roller **2** with interposition of the ink film **6** and intermediate transfer film **8**. In this state, the platen roller **2** is rotated, the plurality of heating elements of the line thermal head **3** are driven selectively to transfer the ink of the ink film **6** onto the intermediate transfer film **8** while the ink film **6** and the intermediate transfer film **8** are being fed, that is, while the ink film **6** and the intermediate transfer film **8** are being wound on the winding side film roller **5***b* and the winding side roller **9***b* respectively, and the primary transfer image **12** that is a circular reverse image corresponding to the recording region of the transfer medium **11** is formed resultantly. At that time, when the primary transfer image **12** is formed, the dummy image **13** having a rectangular outside configuration is formed simultaneously with the formation of the primary transfer image **12** with a narrow space of 1 to 2 mm between the dummy image **13** and the primary transfer image **12** on the periphery of the circular intermediate transfer image as shown in FIG. **4**. At that time, the dummy image **13** may be formed with a thermal energy of the thermal head **3** that is lower than the thermal energy applied to the primary transfer image **12** so that the density of the dummy image **13** is lower than the density of the primary transfer image **12** as required.

The intermediate transfer film **8** on which the primary transfer image **12** has been formed is moved to the retransfer section **14**. At that time, an optical sensor (not shown in the drawing) provided in the recording apparatus body **1** detects a position detection mark (not shown in the drawing) formed on the intermediate transfer film **8**, and the intermediate transfer film **8** is registered so that the position of the primary transfer image **12** coincides with the image forming position of the transfer medium **11**.

Next, the heating roller **15** that is heated to a desired temperature is moved down. At first, the heating roller **15** is brought into contact with the edge of the holding tray **21** with interposition of the portion where the ink of the intermediate transfer film **8** is not transferred. Starting from this state, the moving table **20** and the intermediate transfer film **8** are moved in the direction of the arrow X as shown in FIG. **1**. When the moving table **20** is moved until the heating roller **15** is brought into contact with the head of the primary transfer image **12** formed on the intermediate transfer film **8** and the head of the transfer medium **11**, the heating roller **15** is brought into contact with the surface of the transfer medium **11** and the surface of the guide member **23** that are positioned at the same vertical level with interposition of the intermediate transfer film **8**.

Furthermore, at that time, when the heating roller **15** is brought into contact with the head of the primary transfer image **12** formed on the intermediate transfer film **8** and the head of the transfer medium **11**, the head of the dummy image **13** formed on the periphery of the primary transfer image **12** is brought into contact with the surface of the guide member **23** by means of the heating roller **15**.

Furthermore, the moving table **20** is moved in the direction of the arrow X as shown in FIG. **1**, and the intermediate transfer film **8** is moved. At that time, because the intermediate transfer film **8** is moved at the same speed and in the same direction as those of the moving table **20**, the transfer medium **11** held on the holding tray **21** of the moving table **20**, the primary transfer image **12** on the intermediate transfer film **8**, and the dummy image **13** are moved at the same speed in the same direction.

Thereby, the primary transfer image **12** on the intermediate transfer film **8** that is heated and pressed by means of the heating roller **15** is melted and pressed on the transfer medium **11** and retransferred onto the transfer medium **11**, the intermediate transfer film **8** is peeled off the surface of the transfer medium **11**, and as a result an image is recorded on the surface of the transfer medium **11**.

Because the dummy image **13** formed on the periphery of the primary transfer image **12** is also in pressure contact with the surface of the guide member **23** by means of the heating roller **15** when the primary transfer image **12** is retransferred, the ink of the dummy image **13** is also heated and remelted by means of the heating roller **15**, and the remelted ink adheres on the surface of the guide member **23** and then peeled off from the surface of the guide member **23** as the intermediate transfer film **8** is moved.

Because the dummy image **13** formed on the periphery of the primary transfer image **12** is remelted and adheres on the surface of the guide member **23** when the primary transfer image **12** is transferred onto the transfer medium **11** as described hereinabove, the tension exerted on the intermediate transfer film **8** is even in the width direction, and the intermediate transfer film **8** is peeled off the transfer medium **11** under good condition. As a result, the primary transfer image **12** of the intermediate transfer film **8** is retransferred consistently to the transfer medium **11**, and good quality image is obtained.

Because fluorine material is coated on the surface of the guide member **23** as described hereinabove to prevent the ink from being transferred and because molten ink of the dummy image **13** adheres on the intermediate transfer film **8** more strongly than on the surface of the guide member **23**, the ink that adheres on the surface of the guide member **23** temporarily adheres on the intermediate transfer film **8** side as the intermediate transfer film **8** is peeled off, and the ink of the dummy image **13** is peeled off the surface of the guide member **23**. As a result, the ink is not transferred on the surface of the guide member **23**.

Next, an embodiment in which a full-color image is recorded on the transfer medium **11** will be described hereinafter.

In the case where a full-color image is recorded as in the present embodiment, the present embodiment is different from the abovementioned first embodiment in that a multicolor ink film **30** having the structure as shown in FIG. **5** is used. As shown in FIG. **5**, a unit recording cycle **33** comprising an ink region **32** of three colors, namely cyan (C) color, magenta (M) color, and yellow (Y) color, arranged in this order (C-color ink region **32**C, M-color ink region **32**M, and Y-color ink region **32**Y) for forming a full-color image is arranged repeatedly on one side of a long film base material **31** formed of resin film consisting of PET in the longitudinal direction. The unit recording cycle **33** is used in the order successively from C-color ink region **320**, M-color ink region **32**M, to Y-color ink region **32**Y when the primary transfer image **12** that is a reverse image is formed on the intermediate transfer film **8**.

In the case of the multicolor ink film **30** used in the present embodiment, the K-color marker transfer ink region **34** is formed on the boundary between adjacent unit recording cycles **33** as the ink region that is exclusively used to form the register mark (not shown in the drawing) that serves as the positional reference when the primary transfer image **12** is formed on the intermediate transfer film **8** and the primary transfer image **12** is retransferred on a transfer medium **11**. The combined region formed from one marker transfer ink region **34** and one unit recording cycle **33** disposed just after the marker transfer ink region **34** is regarded as one image forming recording cycle **35**.

Furthermore, in the multicolor ink film **30** of the present embodiment, ink regions **32** of the respective colors, each of which ink region constitutes the unit recording cycle **33**, are formed on one side of the film base material **31** on which the image forming recording cycle **35** is formed so that the narrow space of the bare film base material **31** remains on the other side edge of the film base material **31**. On the bare narrow space, the marker transfer ink regions **34** that constitute the image forming recording cycle **35** and the detection markers **36** that detect the head position of each color ink region **32** that constitutes the unit recording cycle **33** are formed. Each of the detection markers **36** is a marker comprising one or more ink lines that extend in the width direction of the film base material **31**. Each of the detection markers **36** is formed so that the rear end of the detection marker **36** is located at the position on the upstream side in the feeding direction of the multicolor ink film **30** from the head position of each color ink region 32, which is a component of the marker transfer ink region 34 and the unit recording cycle 33, separated by a desired distance.

A marker detection sensor (not shown in the drawing) provided in the recording apparatus body **1** detects a detection marker **36**. Thereby, the head position of ink regions **32** and **34** indicated by means of the detection marker **36** is fed between the line thermal head **3** and the platen roller **2** of the recording apparatus body **1** in the intermediate transfer recording apparatus.

FIG. **6** is a flowchart showing the feeding control of the intermediate transfer film **8** fed when the primary transfer image **12** is formed, the feeding control of the multicolor ink film **30** relating to transfer of the register mark, and the feeding control of the multicolor ink film **30** that is used for forming the full-color primary transfer image by use of respective ink regions that constitute the unit recording cycle. All this feeding control is executed by means of a control section provided in the recording apparatus body **1** of the intermediate transfer recording apparatus of the present embodiment.

As shown in the flowchart, at first the intermediate transfer film feeding motor is driven in response to the command supplied from the control section when the line thermal head **3** starts to form an image on the intermediate transfer film **8** to thereby rotate the winding side roller **9***b*. The intermediate transfer film **8** is fed idly (step ST**1**), a sensor (not shown in the drawing) detects the unused region (step ST**2**), and the intermediate transfer film **8** is registered so that the head of the unused region is moved to the position of the recording section where the heating elements of the line thermal head **3** faces the platen roller **2** (step ST**3**).

On the other hand, the film feeding motor is driven to rotate the winding side film roller **5***b*, and the multicolor ink film **30** is fed in the feeding direction (step ST**11**). When a marker detection sensor (not shown in the drawing) provided in the recording apparatus body **1** detects the detection marker **36**K that indicates the head position of the marker transfer ink region (step ST**12**), the feeding is stopped (step ST**13**). The line thermal head **3** is brought into contact with the platen roller **2** which is in the head down state, and a register mark is formed on the intermediate transfer film **8** by use of the marker transfer ink region **34** (step ST**4**).

Thereafter, the intermediate transfer film on which the register mark has been formed is moved backward temporarily so that the position where the register mark is formed is positioned on the upstream side of the feeding direction from the position where the marker detection sensor is disposed. In other words, the intermediate transfer film feeding motor is rotated reversely to rotate the feeding side film roller **5***a* reversely, the intermediate transfer film **8** is rewound and then fed in the forward direction again (step ST**5**), and the register mark formed on the intermediate transfer film **8** is aligned (step ST**6** and step ST**7**). The intermediate transfer film 8 is fed idly by a predetermined length by the use of the register mark as a reference (step ST**8**).

On the other hand, in the case of the feeding control of the multicolor ink film **30**, the film feeding motor is driven to feed the multicolor ink film **30** (step ST**21**), a detection marker **36**C that indicates the head position of the C-color ink region **32**C (step ST**22**), which is the ink region of the first color of the unit recording cycle **33**, is detected, and the head position of the C-color ink region **32**C is supplied to the recording section (step ST**23**).

A C-color reverse image for one picture is formed on the intermediate transfer film **8** by use of the C-color ink region **32**C of the multicolor ink film **30** (step ST**9**). At that time, when the primary transfer image is formed, the dummy image **13** having a rectangular outside configuration is formed at the same time when the primary transfer image **12** is formed so that a narrow space of 1 to 2 mm is formed on the periphery of the circular primary transfer image **12** as in the case of the abovementioned first embodiment. At that time, the dummy image **13** may be formed with a thermal energy of the thermal head **3** that is lower than the thermal energy applied to the primary transfer image **12** so that the density of the dummy image **13** is lower than the density of the primary transfer image **12** as required.

Next, whether or not forming of the primary transfer image is completed by use of all the color regions of the unit recording cycle **33** is checked. If the formation of the primary transfer image is completed, then primary transfer image forming is brought to an end. On the other hand, if

primary transfer image forming is not completed, then the sequence returns to the abovementioned step ST**5** and step ST**21** again.

In detail, the intermediate transfer film **8** that has been fed during C-color primary transfer image forming operation is moved backward to align the register mark formed on the intermediate transfer film **8**. Simultaneously, according to the control method as described hereinabove, the detection marker **36**M that indicates the head position of the M-color ink region **32**M constituting the unit recording cycle **33** of the multicolor ink film **30** is detected. An M-color reverse image for a picture is formed on the C-color reverse image for one picture formed on the intermediate transfer film **8** by use of the M-color ink region **32**M of the multicolor ink film **30** in the state that the head position of the M-color ink region **32**M is supplied to the recording section. At that time, the M-color ink layer **32**M may be additionally applied for double printing on the dummy image as required.

Subsequently, the intermediate transfer film that has been fed during M-color primary transfer image forming operation is moved backward by a predetermined length and then moved forward again to align the register mark formed on the intermediate transfer film **8** as in the case described hereinabove. Thereafter, the detection marker **36**Y that indicates the head position of the Y-color ink region **32**Y of the unit recording cycle **33** of the multicolor ink film **30** is detected. A Y-color reverse image for one picture is formed on the C-color and M-color reverse images for a picture formed on the intermediate transfer film **8** by use of the Y-color ink region **32**Y of the multicolor ink film **30** in the state that the head position of the Y-color ink region **32**Y is supplied to the recording section.

Thus, a desired reverse image that is the primary transfer image for one picture is formed on the intermediate transfer medium. At that time, the C-color ink layer **32**C may be applied additionally on the dummy image as required.

The retransfer and recording of the primary transfer image on the intermediate transfer film **8**, which has completed forming the primary transfer image and the dummy image onto the transfer medium, may be carried out in the same manner as in the abovementioned first embodiment. As a matter of course, the same effect as obtained in the abovementioned first embodiment can be obtained in the present embodiment.

The present invention is by no means limited to the abovementioned embodiments, and various modifications may be applied as required.

As described hereinbefore, according to the intermediate transfer recording apparatus in accordance with the present invention, a retransfer condition is optimized and a high quality recorded image can be formed on the recording medium because the image adhesion region can be maintained uniform throughout the process from the start of retransfer operation to the end of the operation when the primary image of the intermediate transfer film is retransferred onto a disk-like transfer medium.

In detail, a dummy image is formed on the region where the primary transfer image is not retransferred on the transfer medium on the periphery of the retransfer image region corresponding to the transfer medium when the primary transfer image is formed on the intermediate transfer film. Thereby, the dummy image is in contact with the upper surface of the guide member of the transfer medium of the periphery of the transfer medium when the primary image is retransferred onto the transfer medium, and heated and pressed by means of the heating means. The dummy image is retransferred in the same manner as when the primary image is retransferred onto the transfer medium. The retransfer region is maintained approximately constant throughout the retransfer operation, the peeling tension exerted on the intermediate transfer film is approximately even in the width direction, and the primary transfer image is retransferred onto the transfer medium without changing the transfer condition. As a result, an optimal retransfer condition can be obtained.

Because the dummy image is formed on the periphery of the primary transfer image with a predetermined space between the dummy image and the primary transfer image, retransfer of the dummy image onto the transfer medium is prevented even if the registration between the primary image and the transfer medium deviates slightly when the primary image is retransferred onto the transfer medium.

Also, because the outside peripheral configuration of the dummy image is rectangular, the retransfer region is maintained constant throughout the retransfer operation from the start when the primary image is retransferred onto the transfer medium. As a result a retransfer condition is optimized.

In addition, because the dummy image is formed with a density lower than that of the primary transfer image, the power supplied to the thermal head can be reduced for the dummy image forming region, and as a result power consumption can be minimized.

Furthermore, in the case where the dummy image is formed by the use of at least one color ink layer of the multicolor ink film, and the dummy image is formed with less thermal energy than that used for forming the primary transfer image, not only is power saved but also the time required to form the dummy image is shortened relative to the case in which all of the color ink layers are used to form the dummy image.

What is claimed is:

1. A transfer recording apparatus comprising:

a line thermal head for transferring ink of an ink film on an intermediate transfer film to form a primary transfer image,

a transfer medium, and

a retransfer means for forming a desired image on the transfer medium,

wherein a dummy image is formed on a periphery of a retransfer image region on the transfer medium, and the primary transfer image is not retransferred when the primary transfer image is formed on the intermediate transfer film.

2. A transfer recording apparatus according to claim **1**, wherein the dummy image is formed on a periphery of the primary transfer image with a predetermined space between the dummy image and the primary transfer image.

3. A transfer recording apparatus according to claim **2**, wherein an outside peripheral configuration of the dummy image is rectangular.

4. A transfer recording apparatus according to claim **2**, wherein the dummy image is formed with a density lower than that of the primary transfer image.

5. A transfer recording apparatus comprising:

a line thermal head for transferring ink of a multicolor ink film on an intermediate transfer film to form a primary transfer image,

a transfer medium

a retransfer means for forming a desired image on the transfer medium,

wherein a dummy image is formed on a periphery of the retransfer image region on the transfer medium, and the primary transfer image is not retransferred when the primary transfer image is formed on the intermediate transfer film.

6. A transfer recording apparatus according to claim **5**, wherein the dummy image is formed by using at least one color ink layer of the multicolor ink film, and the dummy image is formed with less thermal energy than that used for the primary transfer image.

7. A method of transferring images comprising

driving a line thermal head to transfer ink of an ink film on an intermediate transfer film to form a primary transfer image,

retransferring the primary transfer image on a transfer medium using a retransfer means to form a desired image on the transfer medium, and

forming a dummy image on a periphery of a retransfer image region on the transfer medium, wherein the primary transfer image is not retransferred when the primary transfer image is formed on the intermediate transfer film.

8. A method according to claim **7**, wherein the dummy image is formed on a periphery of the primary transfer image with a predetermined space between the dummy image and the primary transfer image.

9. A method according to claim **8**, wherein an outside peripheral configuration of the dummy image is rectangular.

10. A method according to claim **8**, wherein the dummy image is formed with a density lower than that of the primary transfer image.

11. A method of forming images comprising

driving a line thermal head to transfer ink of a multicolor ink film on an intermediate transfer film to form a primary transfer image,

retransferring the primary transfer image on a transfer medium using a retransfer means to form a desired image on the transfer medium, and

forming a dummy image on a periphery of a retransfer image region on the transfer medium,

wherein the primary transfer image is not retransferred when the primary transfer image is formed on the intermediate transfer film.

12. A method according to claim **11**, wherein the dummy image is formed by using at least one color ink layer of the multicolor ink film, and the dummy image is formed with less thermal energy than that used for the primary transfer image.

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